GOSSEN METRAWATT

METRAHIT | WORLD
International TRMS Multimeter

3-349-527-03
9/6.19

- Resolution: 100 µV, 100 mΩ, 10 µA, 10 pF, 0.1 Hz
- Precision temperature measurement (–50 ... +800 °C)
- Frequency and duty cycle measurement at 2 to 14 V signals up to 1 MHz
- Capacitance measurement
- RPM Measurement with Inductive Sensor (accessory)
- Automatic and manual measuring range selection
- Backlit digital display with additional analog scale
- Measured value memory, Hold, Max-Min value
- Overload and blown fuse indicators
- IP 40 protection
- Protective rubber holster
- 3 year guarantee
- DAkkS calibration certificate included as a standard feature

Features

Automatic Blocking Sockets (ABS) *

Automatic blocking sockets prevent incorrect connection of measurement cables and inadvertent selection of the wrong measured quantity. This significantly reduces danger to the user, the instrument and the system under test, and eliminates it entirely in many cases.

Automatic / Manual Measuring Range Selection

Measured quantities are selected with the rotary switch. The measuring range is automatically matched to measured values. The measuring range can be selected manually as well with the help of the AUTO/MAN key.

Display of Negative Values at the Analog Scale

Negative values are also displayed at the analog scale for zero-frequency quantities, allowing for observation of measured quantity fluctuation around the zero-point.

Storage of Measured Values

By pressing the **HOLD**/MIN/MAX key, the currently displayed measurement value can be „frozen“ in the display.
The minimum and maximum values which were present at the input of the measuring instrument after activation of the MIN/MAX mode can be selectively "retained" with the MIN/ MAX function. The most important application is the determination of the minimum or maximum value during long-term observation of measurement quantities. MIN/MAX has no effect on the analog display; it continues to display the current measurement value.

Continuity Test

Allows for the detection of short-circuits and interrupted conductors. In addition to displaying test results, an acoustic signal can also be generated if desired.

Power Saving Circuit

The device is switched off automatically if the measured value remains unchanged for a period of approximately 15 minutes, and if none of the controls are activated during this time. Automatic shutdown can be deactivated.

Protective Cover for Harsh Conditions

The instrument is protected against damage in the event of impacts or dropping by means of a soft rubber cover with tilt stand. The rubber material also assures that the instrument does not wander if it is set up on a vibrating surface.

Duty Cycle Measurement – Measurement of 5 V Square-Wave Signals

This function makes it possible to test circuits and transmission cables by measuring the frequency and the duty cycle of pulses with amplitudes of 2 to 14 V and frequencies of 100 Hz to 10 kHz.

Voluntary Manufacturer's Guarantee

36 months for material and workmanship
1 ... 3 years for calibration (depending on application)

* Patented (patent no. EP 1801 598, US 7,439,725)

International TRMS Multimeter

Characteristic Values

Meas. Function	Measuring Range		Resolution 6000	Input Impedance ⎓	Input Impedance ~	Intrinsic Uncertainty at Max. Resolution under Reference Conditions ±(... % rdg. + ... d) ⎓	Intrinsic Uncertainty at Max. Resolution under Reference Conditions ±(... % rdg. + ... d) ~ [5]	Overload Capacity [1] Value	Overload Capacity [1] Time	Meas. Function
V	600 mV		100 µV	10 MΩ // < 40 pF	8.1 MΩ // 50 pF	0.5 + 5	1 + 5	1000 V DC AC eff Sinus	Cont.	**V**
	6 V		1 mV	5.2 MΩ // < 40 pF	4.6 MΩ // 50 pF	0.5 + 5				
	60 V		10 mV	5 MΩ // < 40 pF	4.4 MΩ // 50 pF	0.5 + 5				
	600 V		100 mV	5 MΩ // < 40 pF	4.4 MΩ // 50 pF	0.5 + 5				
	1000 V		1 V	5 MΩ // < 40 pF	4.4 MΩ // 50 pF	0.5 + 5				
				Voltage drop at approx. range limit						
				⎓	~	⎓	~ [5]			
A	60 mA		10 µA	100 mV	100 mV	1.0 + 5 (> 10 D)	1.5 + 5 (> 10 D)	1.0 A	Cont.	**A**
	600 mA		100 µA	700 mV	700 mV					
	6 A		1 mA	200 mV	200 mV			10 A [4]	Cont.	
	10 A		10 mA	300 mV	300 mV					
				Open-circuit voltage	**Meas. current at range limit**	**±(... % rdg. + ... d)**				
Ω	600 Ω		100 mΩ	max. 1 V	max. 250 µA	1 + 5 [2]		1000 V DC AC eff Sinus	max. 10 s	Ω
	6 kΩ		1 Ω	max. 1 V	max. 100 µA	0.7 + 3				
	60 kΩ		10 Ω	max. 1 V	max. 12 µA	0.7 + 3				
	600 kΩ		100 Ω	max. 1 V	max. 1,2 µA	0.7 + 3				
	6 MΩ		1 kΩ	max. 1 V	max. 120 nA	0.7 + 3				
	40 MΩ		10 kΩ	max. 1 V	max. 50 nA	2.0 + 3				
⧫	2 V		1 mV	max. 3 V		1.0 + 5				⧫
🔊	600 Ω		0.1 Ω	max. 1 V	max. 250 µA	1.0 +5				🔊
						±(... % rdg. + ... K)				
°C	TYP K	−50,0 ... +400 °C	0,1 °C			1.0 + 5 K [3]		1000 V DC/AC eff Sinus	max. 10 s	°C
		+401 ... +800 °C	0,1 °C			5.0 + 7 K [3]				
						±(... % v. MW + ... °F)				
°F	TYP K	-58 ... +752 °F	0,1 °F			1.0 + 9 °F [3]		1000 V DC/AC eff Sinus	max. 10 s	°F
		+753 ... +1472 °F	1 °F			5.0 + 11 °F [3]				
				Power limit		**±(... % rdg. + ... d)**				
Hz (V ~)	100 Hz		0,1 Hz	3 x 10^6 V x Hz @ U > 100 V		0.1 + 2		1000 V	max. 10 s	Hz (V ~)
	1000 Hz		1 Hz							
Hz	10 ... 100 Hz		0,1 Hz	3 x 10^6 V x Hz @ U > 100 V		0.1 + 2		1000 V	max. 10 s	Hz
	1000 Hz		1 Hz							
	1000 kHz		1 kHz							
				Power limit						
%	30 Hz ... 1KHz: 2,0 ... 98,0			3 x 10^6 V x Hz @ U > 100 V		0.2% v.MUL + 8 D		1000 V	max. 10 s	%
	1 kHz ... 4 kHz: 5,0 ... 95,0					0.2% v.MUL/kHz + 8 D				
	40 kHz ... 10 kHz:10,0 ...90,0					0.2% v.MUL + 8 D				
Rpm	0.060 k... 99.99 k		1 Rpm	**Discharge Resistance**		± 2 Rpm		1000 V	max. 10 s	Rpm
						±(... % rdg. + ... MR)				
F	40 nF		10 pF	10 MΩ		2.0 + 10 with zero activ		1000 D DC AC	max. 10 s	F
	400 nF		100 pF	1 MΩ		1.0 + 6				
	4 µF		1 nF	100 MΩ		1.0 + 6				
	40 µF		10 nF	12 MΩ		2.5 + 6				
	400 µF		100 nF	3 MΩ		5.0 + 6				

1) At 0 to + 40 °C
2) With zero balancing, or + 35 digits without zero balancing
3) Without sensor
4) 12 A for 5 min, 16 A for 30 s
5) 1 ... 35 d from the zero point due to TRMS converter when probe tips are short-circuited

Key

rdg. = reading (measured value)
d = digit
MUL = upper range limit
MR = measuring range

Reference Conditions

Ambient temperature	+ 23 °C ± 2 K
Relative humidity	40 ... 60%
Measured quantity frequency	45 ... 65 Hz
Measured quantity waveshape	Sinusoidal
Battery voltage	3 V ± 0.1 V

Influencing Quantities and Influence Error

Influencing Quantity	Sphere of Influence	Measured Quantity / Measuring Range	Influence Error [1] ±(... % rdg. + ... digits)
Temperature	0 °C ... +21 °C and +25 °C ... +40 °C	600 mV ⎓	1.0 + 3
		6 ... 600 V ⎓	0.15 + 1
		1000 V ⎓	0.2 + 1
		V ∼	0.4 + 2
		0 Ω [2]	0.15 + 2
		600 Ω [2]	0.25 + 2
		6 kΩ ... 6 MΩ	0.15 + 1
		40 MΩ	1.0 + 1
		mADC, ADC	0.5 + 1
		mAAC, AAC	0.75 + 1
		– 50 ... + 200 °C	0.5 K + 2
		+ 200 ... + 400 °C	0.5 + 2
Measured Quantity Frequency	> 30 Hz ... 45 Hz	A ∼	2.0 + 10
	> 65 Hz ... 1 kHz	60 / 600 mA / 6 A	1.5 + 10
		10 A	2 + 10
	> 30 Hz ... 45 Hz	600 mV	3 + 10
		6 / 60 /600 V	2.5 + 10
		1000 V	3.5 + 20
	> 65 Hz ... 500 Hz	600 mV	35 + 20
	> 65 Hz ... 800 Hz	6 / 60 V	2.5 + 10
		600 V	3 + 20
		1000 V	3.5 + 20

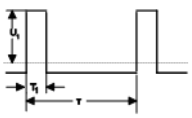
Influencing Quantity	Sphere of Influence	Measured Quantity / Measuring Range	Influence Error
Battery Voltage	⏚ [3] ... < 2.9 V > 3.1 V ... 3.6 V	V ⎓	± 2 Digits
		V ∼	± 4 Digits
		A ⎓	± 4 Digits
		A ∼	± 6 Digits
		60 Ω / 600 Ω / °C	± 4 Digits
		6 kΩ ... 40 MΩ	± 3 Digits
Relative Humidity	75% 3 days Instrument off	V ≃ A ≃ Ω °C	1 x intrinsic uncertainty
HOLD	—		± 1 Digits
MIN / MAX	—	V ≃ , A ≃	± 2 Digits

[1] For temperature: specified error valid starting with temperature changes as of 10 K.
For frequency: specified error valid starting with display values as of 300 digits.
[2] With zero balancing
[3] After the ⏚ symbol appears at the display

Influencing Quantity	Sphere of Influence	Measuring Ranges	Damping
Common Mode Interference Voltage	Interference quantity max. 600 V ∼	V ⎓	> 120 dB
	Interference quantity max. 600 V ∼ 50 Hz, 60 Hz sine	3 V ∼, 30 V ∼	> 80 dB
		300 V ∼	> 70 dB
		600 V ∼	> 60 dB
Series Mode Interference Voltage	Interference quantity: V ∼, respective nominal value of the measuring range, max. 600 V ∼ , 50 Hz, 60 Hz sine	V ⎓	> 50 dB
	Interference quantity max. 600 V ⎓	V ∼	> 110 dB

Crestfaktor CF

Test signal: Rectangle 55 Hz, no DC component



$$CF = \frac{U1}{Ueff}$$

$$Ueff = U1\sqrt{\frac{T1}{T - T1}}$$

Influencing Quantity	Sphere of Influence	Measured Quantity / Measuring Range	Influence Error
Crest factor CF	1.5 < CF ≤ 2	6 V, 60 V, 600 V, 1000 V ∼	±1 % rdg.
	2 < CF ≤ 4		±5 % rdg.

The admissible crest factor CF of the alternating quantity to be measured depends on the display value.

Crest factor 4 at the end of range, it is increased accordingly when the range is reduced. However, due to input protection, voltage is limited to 1000 V, therefore the admissible crest factor in the 600 V ranges is half as high.

Power limiting: voltage x frequency max. 3 x 10^6 V x Hz.

Response Time (after manual range selection)

Measured Quantity / Measuring Range	Response Time		Measured Quantity Step Function
	Analog Display	Digital Display	
V ⎓, V ∼, A ⎓, A ∼	0.7 s	1.5 s	from 0 to 80% of the upper range limit
600 Ω ... 6 MΩ	1.5 s	2 s	from ∞ to 50% of the upper range limit
40 MΩ	4 s	5 s	
⭲⭰	—	1.5 s	
🔊	—	< 50 ms	
°C	—	max. 3 s	from 0 to 50% of the upper range limit
F	—	max. 5	

Display

LCD panel (65 mm x 30 mm) with analog and digital display including unit of measure, type of current and various special functions

Analog:

Display	LCD scale with pointer
Scale length	55 mm in all ranges
Scaling	0 ... ± 60 with 61scale divisions in all ranges
Polarity display	With automatic switching
Overflow display	Triangle
Measuring rate	30 measurements per second

Digital:

Display / char. height	7-segment characters / 15 mm
Number of places	$3^6/_7$-place ≙, 6000 steps
Overflow display	„*0.L*“ appears
Polarity display	“–” sign is displayed if plus pole is connected to ⊥
Measuring rate	3 measurements per second

Electromagnetic Compatibility (EMC)

Interference emission	EN 61326-1: 2013 class B
Interference immunity	EN 61326-1: 2013 EN 61326-2-1:2013

International TRMS Multimeter

Power Supply

Battery	2 x 1.5 V AA size batteries, alkaline manganese per IEC LR6 or equivalent rechargeable NiCd battery
Service life	With alkaline manganese: approx. 750 hours for V ⎓, A ⎓ approx. 200 hours for V ∼, A ∼
Battery test	⊣ is displayed automatically if battery voltage drops to below approximately 2.1 V.

Electrical Safety

Safety class	II per IEC 61010-1:2010/EN 61010-1:2010/VDE 0411-1:2011
Measuring category	1000 V CAT III, 600 V CATIV
Nominal voltage	1000 IV
Pollution degree	2
Test voltage	6.7 kV~ per IEC 61010-1/EN 61010-1

Fuses

Fuse links for all ranges	
up to 600 mA	FF 1.6 A/1000 V, 6.3 mm x 32 mm, switching capacity: 10 kA at 1000 V~ with ohmic load, protects all current measuring ranges up to 600 mA in combination with power diodes
Fuse links for all ranges up to 10 A	FF 10 A/1000 V, 10 mm x 38 mm, switching capacity: 30 kA at 1000 V with ohmic load, protects 6A and 10 A ranges to 1000 V

Data Interface

Type	Optical via infrared light through the housing
Data transmission	Serial, bidirectional (not IrDa compatible)
Protocol	Device specific
Baud rate	9600 baud

The USB plug-in interface adapter (see accessories) is used for adaptation to the PC's USB port.

Ambient Conditions

Accuracy range	0 °C ... + 40 °C
Operating temp.	–10 °C ... + 50 °C
Storage temperature	–25 °C ... + 70 °C without batteries
Relative humidity	45 ... 75%, no condensation allowed
Elevation	to 2000 m

Mechanical Design

Protection	IP 40, IP 20 at the connector jacks per DIN VDE 0470, part 1 / EN 60529
Dimensions	84 mm x 195 mm x 35 mm
Weight	Approx. 350 gr. with battery

Applicable Regulations and Standards

IEC 61010-1/EN 61010-1/ VDE 0411-1	Safety requirements for electrical equipment for measurement, control and laboratory use
EN 60529 VDE 0470, Part 1	Test instruments and test procedures Protection provided by enclosures (IP code)
DIN EN 61326-2-1 VDE 0843-02-2-1	Electrical equipment for measurement, control and laboratory use – EMC requirements – Part 2-1: Particular requirements for sensitive test and measurement equipment
DIN EN 60529 DIN VDE 0470 Part 1	Test Instruments and test procedures – Degree of protection provided by enclosures (IP code)

Standard Equipment

1 TRMS-digital multimeter
1 protective rubber holster
2 2 x 1.5 V AA size batteries
1 set of measurement cables KS17-2
1 DAkkS calibration certificate
1 short-form operating instructions

Detailed operating instructions are available on our website www.gossenmetrawatt.com.

Order Information

Description	Type	Article Number
Analog-digital multimeter with IR interface, standard equipment see above	METRAHIT WORLD	M206A
Accessories		
Fast reacting surface temperature sensor, type K (NiCr-Ni) –50 ... +400 °C	TF400SURFACE	Z102E
Clip-on current transformer, 30 mA ... 150 A~, 1000:1, ±2.5 %, 1 mA/A	WZ12D	Z219D
Carrying pouch	F829	GTZ3301000R0003
Imitation leather carrying pouch for one METRA*Hit*® and accessories	F836	GTZ3302000R0001
Hard case for 1 METRA*Hit*® and accessories	HC20	Z113A
Hard case for two METRA*Hit*®, adapter and accessories	HC30	Z113B
Fuses (pack of 10)	FF 1.6 A / 1000 V	Z109C
Fuses (pack of 10)	FF 10 A / 1000 V	Z109L
Accessories for Operation at a PC		
METRAwin10/METRA*Hit* software update and installation instructions	Z3240	GTZ3240000R0001
IR-USB bidirectional interface adapter for **METRAHIT**	USB-HIT	Z216A
Set consisting of interface adapter USB-HIT, USB cable and METRAwin10/METRA*Hit* software	USB-Pack	Z216B

For additional information on accessories, please refer to

- our „Measuring Instruments and Testers“ catalogue
- our website www.gossenmetrawatt.com

METRAHIT | WORLD

International TRMS Multimeter

Prepared in Germany • Subject to change without notice • A pdf version is available on the Internet

GOSSEN METRAWATT

GMC-I Messtechnik GmbH
Südwestpark 15
90449 Nürnberg • Germany

Phone +49 911 8602-111
Fax +49 911 8602-777
E-Mail info@gossenmetrawatt.com
www.gossenmetrawatt.com